



HIGHER EDUCATION UPDATE

JULY 2014

OBSERVATIONS ON THE CURRENT STATUS OF HIGHER EDUCATION
IN AGRICULTURAL SCIENCES, CIVIL ENGINEERING, COMPUTER SCIENCE,
ELECTRICAL ENGINEERING, ENVIRONMENTAL SCIENCES, PHYSICS,
AND TRANSPORT AND COMMUNICATIONS
AT SELECT UNIVERSITIES IN VIETNAM



Study supported by:

MOET



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Recipients of the report are encouraged to share this information broadly in the hope that the observations presented will promote further development of higher education in Vietnam.

We welcome any comments or feedback you might wish to share.

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LIST OF ABBREVIATIONS

ABET	ABET, Inc. (formerly known as Accreditation Board for Engineering and Technology)
AUN	ASEAN ¹ University Network
GPA	Grade Point Average
MARD	Ministry of Agriculture and Rural Development
MOET	Ministry of Education and Training
MOST	Ministry of Science and Technology
NAFOSTED	National Foundation for Science and Technology Development
R&D	Research and Development
SEAMEO RETRAC	Southeast Asian Ministers of Education Organization Regional Training Center
STEM	Science, Technology, Engineering, and Mathematics
S&T	Science and Technology
VEF	Vietnam Education Foundation
VAAS	Vietnam Academy of Agricultural Sciences
VinaREN	Vietnam Research and Education Network

¹ ASEAN = Association of Southeast Asian Nations

² STEM = Science, technology, engineering, and mathematics

³ Accreditation Board for Engineering and Technology is now referred to as ABET.

⁴ The designation of ethnic minority groups has been established by the Vietnamese government.

⁵ In 2005, as part of the “Higher Education Reform Agenda 2020” (HERA), the Prime Minister of Vietnam

EXECUTIVE SUMMARY

In 2005, Prof. Dr. Nguyen Thien Nhan, then the standing Vice Chairman of the People's Committee of Ho Chi Minh City and presently the President of the Vietnam Fatherland Front, requested that the Vietnam Education Foundation (VEF) undertake a study on the status of undergraduate education in Vietnam. The research focused on two of the primary fields studied by VEF Fellows - computer science and electrical engineering, as well as on one field of the basic sciences - physics. The project was undertaken in cooperation with, and supported by, the Ministry of Education and Training (MOET) and the University of Social Sciences and Humanities of the Vietnam National University in Ho Chi Minh City, the Southeast Asian Ministers of Education Organization Regional Training Center (SEAMEO RETRAC) in Vietnam, and the Institute for Educational Research in Ho Chi Minh City. One year later, VEF sponsored a similar project on the status of education in the field of agricultural sciences. The questionnaires, followed by site visits, led to two publications: *Observations on Undergraduate Education in Computer Science, Electrical Engineering, and Physics at Select Universities in Vietnam* in 2006 and *Observations on the Current Status of Education in the Agricultural Sciences in Vietnam* in 2007. These publications have been widely distributed and well-received. The executive summary from each of these publications appears in Appendices 1 and 2.

In 2012, Dr. Phuong Nguyen, Country Director for the VEF Vietnam Field Office in Hanoi, suggested to the VEF Executive Director and the Board of Directors that VEF sponsor another study to follow up on the progress of Vietnamese higher education as part of the VEF 10th year anniversary celebration in 2013. To the extent possible, the same questionnaires, site visitors, and interview rubrics were utilized and the same universities were revisited, in order to make possible a comparison between the situation in the targeted disciplines in 2006 and 2007, and now in 2013. MOET requested that the study include three additional fields of study—civil engineering, environmental sciences, and transport and communications. The VEF Board agreed to add these disciplines to the study and further stipulated that the situation of graduate students also be addressed.

Fourteen Vietnamese universities participated in the project, including eight that took part in the previous research. Criteria for selecting those universities are consistent with those defined in previous reports: (a) their exemplary undergraduate programs in the seven targeted fields; and (b) the large number of VEF Fellows who graduated from these universities.

The U.S. professors, who conducted the research as site visitors, sought to identify any changes that have been made in teaching, learning, and research in higher education in Vietnam, specifically in the fields cited above. Insights gleaned from this study and recommendations and suggestions for further development should be useful not only to the 14 participating Vietnamese universities, but also to other Vietnamese universities as they work toward improving the quality of education programs in the seven targeted fields, as well as in other fields.

In July 2013, the U.S. site visitors concluded that much had changed since the initial observations were made in 2006 and 2007. Some of the same challenges remain, but great improvements have been made. Rote memorization has been replaced by active learning methodologies in many universities. Homework, group projects, and research are more commonly included in undergraduate study in the fields observed. Most of the students own, or have access to, a laptop and high-speed Internet; however, classrooms, libraries, and laboratory facilities are often inadequate. The curriculum has been reformed in many programs and universities, but the problem of excessive contact hours with insufficient time to learn and internalize the information still remains. The imbalance between theory and practice in classes has improved greatly, but continues nonetheless. There is greater flexibility in taking elective courses, but there is still a heavy burden of courses that do not contribute to a STEM² education. Examinations are more often spread across the semester and include multiple-choice, short answer, and essay examinations, instead of the oral examinations that were dominant in the past.

Many students regularly evaluate their professors; however, a good teaching evaluation does not greatly benefit the instructor since merit as a teacher does not appear to be rewarded with salary increases. The salaries for instructors remain very low, and many of them teach additional classes or teach elsewhere, and tutor individual students or moonlight in order to support their families. The more they teach, the more they earn. MOET has established some measures to keep the instructor's teaching load from exceeding certain limits so that they may undertake scientific research as well; however, the existing research approval mechanism is quite bureaucratic. Research demands so much time and effort that the return in salary is minimal. While the percentage of instructors with advanced degrees has greatly increased, there are still instructors who have completed only a Bachelor's degree. Access to scientific literature is limited, so instructors cannot include this information in their teaching and research if they have time and resources to conduct any research.

The historic separation of education and training from research institutes in Vietnam – a legacy of the French and Russian educational systems that have strongly influenced Vietnamese educational institutions – still remains although at least 94.5% of the instructors, who responded to the questionnaire claimed to conduct research. Opportunities for overseas doctoral degree recipients returning to Vietnam have improved. Better equipment, facilities, and pay need to be provided if these academics are expected to stay in Vietnam and develop science and technology (S&T). Promoting interaction between educational institutions or co-locating them with research institutes might increase research opportunities for instructors, students, and researchers. Insufficient infrastructure for research within the university itself also should be addressed.

The problem of regionalism continues in Vietnam. Students and graduates of educational institutions like to stay near their homes, and if they go on to graduate school, they like to attend

² STEM = Science, technology, engineering, and mathematics

the same institution. Furthering this regionalism, many employers have a strong bias in favor of hiring graduates from the local university. Regionalism contributes to academic in-breeding and will not be easy to alter, but alternate strategies might encourage specialists from different universities to work together.

Student assessment, instructor assessment, institutional assessment, and accreditation (national, regional, and international) are all moving forward in Vietnam. One department spoke of achieving ABET³ accreditation as early as 2017. Self-assessment and evaluation must continue to move forward. In order to further accreditation, more attention will need to be paid to student learning outcomes.

The 2013 questionnaires were generally parallel to the ones distributed for the earlier VEF reports in 2006 and 2007, but a new question was posed in regard to opportunities in STEM-based fields for women. Overwhelmingly, the Vietnamese students and academics reported that opportunities were equal; but during the interviews, males and females commented that women must make sure that family responsibilities are the first priority. The question of minority⁴ participation in education was also broached in the interviews. Females, minorities, and students from remote regions are less likely to enroll in STEM fields.

An important issue is autonomy for programs, departments, and universities in determining the best courses, teaching methods, and specializations for their institution. The Ministry of Education and Training (MOET) works to ensure that all programs are high-quality. However, instructors, programs, departments, and universities have particular needs that relate to their particular fields of study, to their location in the country, to their goals and aspirations, and to the market-driven needs for education in these specializations and in these locations. Therefore, a standardized policy may not be able to dictate the best practices for every institution. For this reason, the site visitors hope that MOET, as well as individual universities, will consider increasing autonomy in higher education to the fullest extent possible.

While they have provided recommendations, the site visitors generally agree that priorities need to be established by Vietnam in regard to education, research, workforce development, and issues that are critical to Vietnam, such as climate change and its effect on the Mekong Delta. Nevertheless, they have made a number of observations on the present situation of higher education in Vietnam and offer recommendations for addressing the challenges that remain. These observations and recommendations are summarized under the section entitled *Observations and Conclusions* below.

³ Accreditation Board for Engineering and Technology is now referred to as ABET.

⁴ The designation of ethnic minority groups has been established by the Vietnamese government.

BACKGROUND AND METHODOLOGY

PREVIOUS VEF REPORTS

The executive summaries of the previous reports entitled *Observations on Undergraduate Education in Computer Science, Electrical Engineering, and Physics at Select Universities in Vietnam* (2006) and *VEF Observations on the Current Status of Education in the Agricultural Sciences in Vietnam* (2007) are available in Appendices 1 and 2 within this document. The previous VEF reports in both English and Vietnamese are available at the VEF website (<http://projects.vef.gov/followupresearch/index.php?page=Reports>).

METHODOLOGY

This research project utilized a mixed methods approach that included online and archival document review, questionnaires, site-visit interviews, observations, and follow-up correspondence. Methods are mixed so that the strengths are complementary and the weaknesses do not overlap (Tashakkori and Teddlie). The project proceeded as follows:

- Phase 1 (September 2012 to May 2013): updated questionnaires and rubrics and requested the support and cooperation of the Vietnamese ministries and universities
- Phase 2 (May 2013 to June 2013): distributed questionnaires to more than 900 individuals online to provide the site visitors with background information on the current status of Vietnamese higher education
- Phase 3 (July 2013): conducted site visits to 14 Vietnamese universities in four cities – Hanoi, Ho Chi Minh City, Can Tho, and Thai Nguyen; face-to-face interviews with 576 administrators, instructors, students, university alumni, and employers to permit an evaluation of the current status of higher education in the seven targeted fields of study
- Phase 4 (August 2013 to July 2014): compiled results and wrote report

QUESTIONNAIRES

The questionnaires for the administrators, instructors, and students were developed in the following way:

1. The questionnaires used in the first VEF research studies were revised for clarity.
2. Feedback was requested from education experts in the United States and Vietnam, the senior-level VEF staff, and the site visitors.
3. The questionnaires were then tested by focus groups in Vietnam not connected to the project.

A representative at each of the 14 participating universities was asked to provide a link to the online questionnaires to as many students, instructors, and administrators as possible at the selected departments in the targeted fields of study. The questionnaires were available in both English and Vietnamese, and respondents were able to use either language. Information about the universities and their selected departments (brochures, leaflets, website addresses, etc.) were also requested as background information. The blank questionnaires may be viewed on the VEF website at: <http://projects.vef.gov/followupresearch/index.php?page=Survey>.

SITE VISITS

A summary of the findings from the data analysis, background information about each university and the targeted departments, and interview protocols were provided to the U.S. site visitors. The research team (8 U.S. professors and 3 VEF senior staff) participated in the site visits at 14 participating universities, which took place from July 20-29, 2013, in four cities (Can Tho, Hanoi, Ho Chi Minh City, and Thai Nguyen). The research team met with 576 interviewees, which included university administrators, instructors, students (undergraduate and graduate), alumni, and employers. All the respondents signed a form during the interview sessions that guaranteed anonymity to all respondents and that granted VEF permission to use any information gathered for the report. A typical site visit agenda is shown in Table 1.

Table 1: Typical Site Visit Agenda

Time	Activity
7:45 – 8:15 a.m.	Brief campus tour (to include library, labs, canteen, book store, or student center)
8:15 – 9:00 a.m.	1. Meeting with the administrators of the university and departments 2. Presentation on the university and department by the administrator in charge of accreditation and assessment
9:00 – 10:15 a.m.	Individual/group meeting with department and program administrators, including those who have been VEF program participants
10:15 a.m. – 12:15 p.m.	Individual/group meeting with instructors, including those who have been VEF program participants
12:15 – 1:45 p.m.	LUNCH (includes travel if needed)
1:45 – 3:15 p.m.	Individual/group meeting with undergraduate students
3:15 – 4:00 p.m.	Individual/group meeting with graduate students
4:00 – 4:45 p.m.	Individual/group meeting with alumni
4:45 – 5:30 p.m.	Individual/group meeting with employers

RESEARCH DELIMITATIONS AND LIMITATIONS

Delimitations

- Fields of study: Focused on seven fields, which included the four previous fields researched in the earlier VEF reports and the three new fields requested by MOET.
- Vietnamese universities: Limited to 14, which were highly regarded in the specific fields of study and which represented schools in each field in the north and in the south of Vietnam.
- Locations: Limited to cities where select universities were located (Can Tho, Hanoi, Ho Chi Minh City, and Thai Nguyen).

Limitations

- The surveys were distributed by the universities prior to the site visits. Three (3) out of 14 institutions did not participate in the online questionnaires.
- Since these institutions are a sampling of the best universities in Vietnam, the situation described may be better than in many other institutions in the country. The universities visited cannot be deemed representative of all Vietnamese universities.
- Five of the site visits included some respondents from Advanced Programs. These programs have greater resources at their disposal and are taught in English. Distinctions were not made between these students and the others during interview sessions.
- Differences exist in the titles and content of programs and departments, so an exact comparison between institutions may not be possible.
- Sometimes, senior administrators/instructors/supervisors were present at the interview, which may have hindered respondents from speaking frankly. They may also have told the U.S. site visitors what they thought was the best answer in front of their supervisors.
- There were limited resources for the research both in terms of time and funding, so the team could not visit additional sites in the center region of Vietnam.

RESEARCH VALIDITY AND RELIABILITY

The site visitor team included eight prominent and experienced researchers from highly-regarded U.S. universities, four of whom had participated in the first two VEF studies on the status of higher education in Vietnam.

- Interview protocols were provided to the research team in advance of the site visit to enhance consistency among researchers.
- All data (including meetings with Ministry representatives, questionnaire responses, and follow-up correspondence, and other data sources) was triangulated to consider documents,

questionnaire responses, and interviews, as well as the meetings with various agencies and VEF alumni.

- A pilot study was conducted to ensure that the questionnaires and the interview questions were clear and elicited the type of data needed.
- VEF received letters of support and endorsement from four Vietnamese Ministries and government agencies – the Ministry of Education and Training (MOET), the Ministry of Science and Technology (MOST), the Ministry of Agricultural and Rural Development: (MARD), and the Vietnam Academy of Agricultural Sciences (VAAS) – with further support from the U.S. Embassy in Hanoi. A debriefing session was held to present the preliminary findings to Ministry representatives and to the U.S. Embassy staff to brief them on the preliminary findings.
- To encourage candid responses, VEF affirmed in writing and during the interviews that in the final research report, all questionnaire and interview responses would be confidential and that no names would be associated with any statement or information provided.

OBSERVATIONS FROM THE 2013 SITE VISITS

ENGLISH LANGUAGE ACQUISITION

Many of the interview respondents had to rely on translators to understand the questions or to convey their thoughts. The English language skills of the respondents were uneven. English proficiency is important for anyone pursuing a degree in S&T since so much of the scientific literature is written in English and since presentations at scientific conferences are usually made in English as well. Employers interviewed during the site visits also noted that manuals and instructions are printed in English, so employees without English proficiency are not adequately prepared. In the questionnaire results, 88% of administrators said that English study is required at their university, and 75% said that at least one course at their university is taught in English. The Vietnamese government has acknowledged the need for stronger foreign-language skills for the future workforce.⁵ The site visitors suggest that English or other foreign language study should begin in high school or even earlier so that university students may focus on their specializations and not on foreign language acquisition. Additionally, in order to teach language efficiently, many more foreign language teachers will be needed. To teach a course in English well, the instructor must be fully competent in the language. Established English teachers may require additional training or refresher courses.

REGIONALISM

The site visitors coined the term “*regionalism*” to describe the situation where students attend the university closest to home, teach there after graduation, attend graduate school there, and if engaged in business, hire employees from that university. This phenomenon may result from the strong culture of home and family. During the interviews, some Vietnamese students indicated that they rely on the support of their families, financially as well as emotionally, while others made it clear that they have responsibilities to their families and so they do not wish to study too far from home. While study abroad is desirable, few individuals who were interviewed had any interest in teaching at another university in Vietnam as they did not want to move to another area in Vietnam. While talented students often move from remote regions to larger cities for study, going from Hanoi to Can Tho or from Ho Chi Minh City to Thai Nguyen would be unusual. In the United States, attending the same university for multiple degrees or hiring one’s own graduates is known as in-breeding, and such a practice is thought to limit the exchange of ideas and new approaches, and to be detrimental to the individual, the institution, and research in the specific field of inquiry.

⁵ In 2005, as part of the “Higher Education Reform Agenda 2020” (HERA), the Prime Minister of Vietnam established the famous slogan “20,000 Ph.D.s by 2020” (Government Resolution No. 14/2005/NQ-CP, dated November 2, 2005, MOET established the goal that by 2020, 60% of college lecturers and 100% of university lecturers are fluent in a foreign language.

Given the strong cultural basis for regionalism in Vietnam, it may be more productive to talk about other approaches to bring researchers, scientists, and academicians together, such as semester exchanges of students or instructors, national disciplinary conferences, or summer courses sponsored by several universities that will include international guest speakers and presentations made by graduate students.

DIVERSITY

More than 90% of the respondents to the online questionnaires affirmed that females have equal opportunity to enroll in the university, get funding, study abroad, become instructors, and get promotions. At the same time, far fewer women have become Associate or full Professors and are less likely to serve as the PIs of research projects.⁶ During the interviews, it became clear that the equal opportunity statement is conditional. It appears that women's responsibilities to their families have priority over their professional responsibilities. Reportedly, as long as the cooking, cleaning, and child care tasks are completed, women may then have an equal opportunity to excel in science. Some of the interview respondents argued that women should not study some areas of civil engineering because they cannot be involved in construction—they are not physically strong enough and should not be exposed to the hot sun. Another interview respondent noted that job announcements for construction engineers exclude female applicants outright.

As in the United States, Vietnamese women make up a larger percentage of the personnel in some STEM fields and a very small percentage in others.⁷ Respondents at one university affirmed that more than 50% of the instructors in agriculture are female and that a large number of female graduates work for the government, mostly in desk jobs that do not require travel. A number of university alumni, who studied agriculture and agribusiness, stated that employment in the private sector in Vietnam pays more and is the preferred sector of employment for males who graduate with these degrees.

According to those surveyed and interviewed, women in Vietnam are not as likely to enroll in programs such as physics, mathematics, electrical engineering, and computer science, or civil engineering. Nevertheless, women are considered to have equal opportunities to enroll in STEM fields and pursue careers in S&T, but such study is not deemed fully suitable for women, as was affirmed in a recent newspaper article published in Vietnam.⁸

⁶ According to the Vietnam Women's Union, from 2007 to 2012 only 26% of the Associate Professorships and only 11% of the Professorships were awarded to women (Dien Khanh). In 2012 the number of female Principal Investigators in research projects in Vietnam stood at 20%.

⁷ Women's participation is on a par with that of men in fields of agriculture, forestry, and aquaculture (51%), but remains at 33% in other fields of science and technology (General Statistics Department).

⁸ Mai Huynh Nguyen.

The issue of Vietnamese minority groups at Vietnamese universities was not included in any of the questions posed in the questionnaires or the interview rubrics, but the issue arose in some of the interviews nonetheless. One institution noted that it admits minority students, who earned lower national examination scores, and it provides additional training to them so that they are able to succeed. Some students from remote areas talked about returning to their villages; and yet, those who receive advanced degrees may find no employment at home, which is potentially a situation of village brain drain. Nonetheless, the valuable contributions of minorities, of students from remote areas, and of women (more than 50% of the population) may never be utilized if these students are not encouraged to pursue careers in S&T. This potential loss of talent that might be used in the workforce is a serious issue. The site visitors suggested that programs to promote S&T in high schools might convince some of the best students to enroll in STEM study. Such programs should also target girls, members of minority groups, and students in the most remote areas.

ADMISSIONS

In order to enroll in a Vietnamese university, students must take a national entrance exam and indicate their university preferences at the time of registration. There are different thresholds for acceptance at different universities and in different programs, some of which accept only students who indicate that particular university as the first choice. In order for universities to compete for the best talent, a student should be considered equally for admission by all the schools listed by the student. At present, some good schools exclude any applicants who have selected that university as a second or third choice. Universities should also consider more than a raw score for admittance since success in academe requires much more than success on standardized tests.

Students should also be able to transfer from department to department within the same university if they discover that their interests lie in a different realm. At present, in order to transfer into a different department, a student must register for the national entrance examination again and start the admission process over. This requirement should also be eased for students who want to transfer from a community college (two-year school) into a university.

Interview respondents explained that the best students apply first to programs in medicine, engineering, and computer science ahead of programs in forestry, agriculture, and environmental sciences, which are programs of study that may be very important for Vietnam's economic development. Students applying to the latter programs in such important fields should be among the best students, not those who remain after medical schools and computer science and engineering programs have selected their students. At high schools across Vietnam, universities should promote study in fields of science, but particularly in fields of great national need. At the same time, they should target females, minorities, and students from remote areas, as well as males.

Some administrators explained that MOET sets a cap for the number of students each university can admit before the national entrance exams, although the Ministry can increase or decrease the numbers in response to an appeal from a university. The administrators commented that sometimes there is a breakdown in communication when a university has more capacity but no permission to add students, or when the university does not have the capacity to accommodate the number of students that have been approved. The site visitors felt that such decisions are best left in the hands of the university administration and faculty.

TEACHING

Teaching Methodology

Since the earlier VEF reports, instructors' teaching methods have improved greatly. Instructors utilize student-focused and more active learning methods, such as group work, individual presentations, independent study, more discussion, and more laboratory practice. More teaching staff have earned Ph.D.s and Master's degrees, and more of them are conducting research that they share with their students. Some instructors include students in their research. Still, a number of challenges remain.

Great improvements in teaching methodology were reported by students and instructors alike. Academics from the Netherlands have collaborated with several Vietnamese universities to promote active learning, discussion, and group projects. These methods require a greater commitment of time by instructors, who are already teaching extra classes at their own university or at a different school in order to earn a living wage. Instructors related that active learning methods were easy to employ when the class size was around 30, but became a real challenge when classes of 70 to 150 students were assigned to them without the help of a teaching assistant. Instructors who use these active learning techniques should not have their work augmented; rather, their teaching load should be reduced without a reduction in pay. This could be accomplished in part by reducing the number of contact hours required in the current credit system. A teaching assistant is needed for larger classes.

Curriculum Reform

The previous reports expressed concern that students were required to complete too many credits in order to complete a degree: they had insufficient time to internalize and study the course content. It seems that the number of contact hours for students has not decreased, and that the number of contact hours for instructors has increased for many, but this was difficult to accurately assess.

In 2007, MOET changed from a unit-based to a credit-based system. While the number of credits is less than the number of units, the equivalency is roughly 1 credit to 1.5 units, so that a program that previously required 180 units, now requires 120 credits for nearly the same number of contact hours, although more practice sessions, labs, and internship experiences are now

included in the totals; therefore it is difficult to talk about a decrease in the number of required credits without taking into account all the changes that have been made.

While curriculum reform has been announced and promoted by MOET, not all universities seem to have carried out all the changes proposed, such as the changeover to a four-point grading scale, as observed by the site visitors. While the inclusion of more active learning, practice sessions, and internships are quite laudable, the researchers noted that the decrease in the number of credits is not very significant, given the equivalency of 1.5 units to 1 credit.⁹

The site visitors suggest a further reduction in the number of contact hours for students and instructors so that students have more time to study and internalize the content. There should also be a careful assessment of which courses should be dropped from the curriculum. Fundamental or basic classes in STEM subjects should not be removed from the curriculum; their application may not be immediately apparent, but their purpose is critical to the advancement of students interested in STEM fields. Courses that do not contribute to the science or soft skills content for a STEM degree should be eliminated.

Curriculum reform might consider addressing the duplication of similar courses in parallel departments and breaking down the barriers between them. In essence, offering one course instead of multiple duplicate courses will improve efficiency and will provide opportunities for cross-department cooperation in strengthening the content of the course. At the same time, care should be taken not to eliminate important fundamental classes in order to meet the appearance of more actively engaging in applied research. Fundamental knowledge and research is the foundation upon which innovation can be built, but not necessarily in foreseeable ways.

The ultimate goal of curriculum reform should be to provide content that is comparable to what is provided in the best universities in Asia, and ultimately, in the best science and technology programs in the world. Graduates should have a degree that is recognized as high-quality in Vietnam and beyond its borders.

⁹ A credit equals 15 lectures, or 30–45 practice sessions, experiments, or class discussions, or 45–60 hours of essay or dissertation writing, or 45–90 hours of internship experience. In accordance with this measure, MOET has quantified a credit to be the equivalent of 1.5 units. The new system allows the students to select their own courses and design their own majors, based on the requirements established by the university. Many more practice and internship credits are included in these totals. There are required core courses and elective courses, each of which is worth a minimum of two to three credits. The new system also uses letter grades and calculates a cumulative Grade Point Average (GPA) for the students.

Regular students are required to take at least 14 credits per semester; those with a below-average GPA are only required to complete 10 credits per semester. Classification of academic class year is based on the minimum amount of credits the students have accumulated during their attendance at the university. A 6-year university degree program requires 180 credits (150 credits for a 5-year program, 120 credits for 4-year program, and so on). Credits are transferable between universities. Overall, the new system gives students much more autonomy to design their own programs and adjust their course load to their personal needs. It also increases practical learning sessions and field work (Ministry of Education and Training).

Evaluation, Salary Increases, and Promotion

The standard salary for an instructor in Vietnamese higher education is exceedingly low, even when considering that the cost of living is substantially lower in Vietnam. Some interview respondents claimed that an instructor's salary is less than what is provided for a new engineer with a B.S. degree in the corporate sector. In the questionnaires for this research project, instructors with a Bachelor's degree reported an average salary of \$183 per month while those with a Master's degree received \$254, those with a Ph.D. received \$368, and on average, administrators earned \$407 per month. However, these salaries are not equal to "income." Instructor salaries in Vietnam are often correlated with the number of courses taught, which encourages instructors to teach too many sections. Many also teach at other colleges or universities in addition to their full-time jobs.

Researchers concluded that instructors ultimately have little time to pursue research, improve course materials, advise students, and grade papers. Salaries for instructors in the Advanced Programs are substantially higher, but there are only 34 such programs in the country. No one disputes that the average salary is low, but there is strong agreement that funding is limited. Improving the situation for instructors might be done through creative support mechanisms, such as reducing the teaching load, providing teaching assistants, or providing additional support for research and providing opportunities to attend national and international conferences.

The evaluation of instructors is conducted once each year and is based on teaching hours, student feedback, and communication and feedback from outside reviewers. In some institutions, the students evaluate their professors at the end of each course. Seventy percent (70%) of administrators say that instructors are evaluated each semester. Assessment is carried out to improve or develop teaching skills or confirm skill levels, but generally not to justify bonuses, salary increases, or promotions. At present, excellence in teaching does not generate a salary increase. Increases and promotions are currently based on seniority and publications in international journals and apparently on other criteria that instructors claim not to fully understand. Site visitors suggest that merit-based criteria for pay increases and promotions be published on the institution's web site in order to make the process more transparent.

Merit-based salary increases could be awarded for excellence in teaching, research, advising, supervision of students involved in research (in particular, graduate student research for advanced degrees), increased utilization of active student-learning methods, publications, and service to the community. If salary increases are not possible, rewards could include a reduction in the teaching load for the same salary or an assigned teaching assistant to help grade papers, who would also get some teaching experience.

LEARNING

Tuition and Fees

The tuition paid by Vietnamese students is quite small by Western standards (an average of \$138 per semester, according to the questionnaire for this research project), but this amount is difficult enough for those who come from the provinces in low-income areas. Government support for students is provided much more for fields such as electrical engineering and agriculture, and may be based on financial need.

Textbooks

While instructors often put together course notes that are bound like hardback books, foreign published textbooks are typically beyond reach due to cost. According to the online questionnaire, more than half of the students have access to the original textbooks, so access has definitely improved since the last VEF study. A certain degree of photocopying goes on. Increasingly, course notes or other referential information is provided by the instructor via the Internet, but there are still some cases when hard-copy materials must be purchased from the instructors.

Computers and the Internet

Most students have their own computers, even those who come to the university from remote areas, and most have high-speed Internet access. Access on campus may be limited. Sometimes there is no access to the Internet in dormitories. Students and faculty in most Western universities now have direct and easy access to scientific literature via the Internet. While there may be Internet access in Vietnam, scientific literature is mostly not available. When present, typically only the abstracts are accessible.

Teaching Methods

More undergraduate students are doing lab projects, research, and theses. Face-to-face interaction with instructors has increased since the last VEF study. About 53% of the students reported in the questionnaire that their instructors maintain office hours. More and more, students reported that they are expected to engage in more “self-study,” by which they mean research and learning through outside sources, such as scientific articles and other reference books, rather than relying on the information presented in the lecture or in the class notes. Some of the students were not entirely happy with this arrangement, but most were quite happy with expanded active learning.

Examinations

In the 2006-07 VEF studies, most students reported that they were graded primarily on the basis of the final examination, which was often oral. According to the 2013 questionnaire, instructors now use examinations, homework, group projects, and presentations to evaluate students.

According to the students surveyed, most exams are multiple-choice and essay as well as short answer. Fifty-five percent (55%) of the students also indicated that they are evaluated through oral exams. Twenty-three percent (23%) of the students reported that they have weekly exams in some courses.

Opportunities to Conduct Research

Greater numbers of students (70%) also reported that they are encouraged to assist their instructors in conducting research during their degree completion. Forty-three percent (43%) of the students reported that paid research assistant positions are available to Master's students, while 38% reported that paid research assistant positions are available to Ph.D. students.

Employment

The students, including the university alumni interviewed during the site visits, claimed that they are able to find work within three months of graduation. According to 55% of the students, the university helps students find jobs upon graduation. Seventy-one percent (71%) of the students believed that they are well prepared for the job market. When asked in which sectors students planned to work after graduation (respondents could select more than one sector), 65% chose industry, 44% selected the government, 36% were interested in research, and 31% would like to work in academia. Some of the site visitors thought that the Vietnamese universities should take better advantage of their connections with their alumni, which could help establish better relationships with industry as a whole.

Graduate Students

The number of graduate students has increased greatly since the last two studies. Graduate students do not get salary or financial support for their research. One student stated that he needed to buy chemicals and equipment with his own funds in order to carry out his research. Graduate students are in great need of financial support for their studies and research, and they also require full access to the scientific literature. For individuals trying to write a thesis or dissertation, such problems are quite serious.

RESEARCH

In the online questionnaires, 95%¹⁰ of the instructors reported that they conduct research. Administrators reported that 66% of the instructors conduct research. Even if 95% is an exaggeration, it is clear that research is being conducted in more programs and on a larger scale than in 2006-07. Administrators unanimously declared that instructors are encouraged to conduct research and 93% confirmed that the universities provide incentives to the instructors to do so. Many instructors who receive research grants may utilize part of the grant as additional salary.

¹⁰ Numbers throughout this report are rounded down from a fraction of a percent to a full percent.

The questionnaire also reported that up to 35% of the instructor's evaluation may be based on the research.

Students reported that they are involved in research, although the degree to which they are involved is not clear. Some undergraduates stated that they are involved in research only during the final year of study. Both undergraduate and graduate students reported that paid positions as research assistants now exist.

Graduate students as well as some instructors reported that they needed to pay for the materials required for their research out of their own pockets, which certainly hindered them in the process of conducting experiments and in doing complex research. According to university administrators, 49% of the research projects carried out at their universities received funding from the government, 33% from the university itself, 25% from the corporate sector, and 30% from all other funding sources, including support from international universities (respondents could choose more than one funding source).

Support from international institutions has been significant. The site visitors encouraged the researchers to seek collaborative research with external universities or research entities and to become proactive in seeking additional collaborations. With some effort, the Vietnamese institutions can show foreign partners that significant advantages or opportunities exist for research collaboration.

The site visitors also argued that breaking down the barriers between research institutes and educational institutions in Vietnam would be a good way to contribute to the effectiveness of research (with instructors and students serving as support and research assistants) and to the effectiveness of teaching and learning (with researchers teaching and connecting with the rising science workforce). For example, research institute staff may be appointed as visiting faculty. When possible, institutes and educational institutions should be co-located, especially when new campuses are built or old campuses are renovated.

FACILITIES

Computers, Internet Access, and Libraries

As mentioned earlier, most students have their own laptop and claim to be able to access high-speed Internet. However, Internet access is not necessarily available everywhere on campus. Libraries are not up to speed, either in terms of available books or available access to the scientific literature. Libraries also serve as study centers for students who do not have a comfortable or quiet place to read and study at home or elsewhere. Libraries, then, should be large, comfortable, quiet, and air-conditioned.

Scientific Literature

University staff, instructors, graduate students, and undergraduate students all need access to scientific literature. The site visitors recommended a number of different web sites where access is possible to fairly recent publications, such as the *Directory of Open Access Journals* (doaj.org), or *The Essential Electronic Agricultural Library* (TEEAL) at Cornell University (www.teall.org). The site visitors also noted that many professional organizations may provide free or a reduced-rate access to their publications for developing countries and that a few publications become available free after a certain period of time. Some other useful websites appear in the *Additional Resources* section.

Classrooms, Laboratories, and Offices

Facilities are not fully adequate in terms of classrooms, laboratories, libraries, and campus dormitories. Campus dormitory rooms often house ten or more students in one room and may not provide individual desks or Internet access. As a result, any students who travel to the university from remote areas may find themselves in a more difficult living and studying environment, compared to students who live locally. Furthermore, equipment and supplies for experiments and practical work are lacking.

While there are state-of-the-art laboratory facilities at some institutions, they are quite limited; and the site visitors were concerned about the ability to maintain complicated equipment. Since so many resources have already been invested in Ph.D. students who have completed degrees abroad, supporting their return to Vietnam should be approached as a high priority. There seems to be a serious breakdown in how to reintegrate these scholars into the academic institutions upon their return to Vietnam. If these Ph.D. recipients are unable to use the skills they learned abroad, Vietnam may lose them. Government support for returning students with advanced degrees to set up an initial laboratory seems to be a logical next step to continue support for students who have pursued a doctoral degree overseas.

Facilities for instructors are limited, so office hours are consequently limited. At one university, multiple instructors were assigned to one desk. Advising or carrying out research under these conditions is difficult.

Solving all of these problems at once will be a challenge. In any case, educational institutions will need to decide on their plan of action, whether to begin with broader Internet access, or upgrading classrooms, or improving conditions for specific returning students, or focusing on one or two programs, as with the Advanced Programs. Action is needed to move forward.

EVALUATION

Evaluation of Instructors by Students

Instructors were generally not evaluated by students, as reported in the 2006-07 reports. In many departments, students now evaluate instructors every semester. Most often, the results are transmitted to the Dean, and if there is a problem, the Dean speaks with the instructor. Instructors are evaluated by administrators as well, but usually not more than once per year. Excellence in teaching and advising does not influence salary increases, which are more closely related to seniority, research success, and publications in international journals.

Accreditation

Peer evaluations of departments are being conducted by regional associations, such as the ASEAN¹¹ University Network (AUN) and ABET. Some universities expect to have some of their programs accredited by ABET by 2017. Accreditation will encourage international students to enroll in Vietnamese institutions and will establish the groundwork for more 2 + 2¹² programs, with credits transferable abroad.

CONNECTIONS WITH INDUSTRY AND THE PRIVATE SECTOR

Educational institutions and the private sector could both benefit from communicating more closely. Many university instructors have developed close working relations with industry that provide research and development funding, some of which is used by the instructors to augment their own salaries. More could certainly be done, particular in the realm of tech transfer. Establishing tech transfer centers at universities, as well as incubators, could help build industry cooperation. Legislation, parallel to the Bayh-Dole Act in the United States in regard to the rights of intellectual property, could help to engage the educational and industrial sectors¹³.

Industry could be asked to provide more paid internships for students and to donate equipment to the university so that students will already be trained to use the equipment when they graduate. Researchers from industry could teach, give seminars, or provide training to university students in order to identify future employees.

AUTONOMY

Insufficient autonomy for individual instructors, programs, departments, administrators, and universities as a whole was considered a major impediment to the development of Vietnamese

¹¹ ASEAN = Association of Southeast Asian Nations

¹² 2 + 2 programs usually involve 2 years of study in the home country, followed by 2 years in the host country. The degree may be issued by either of the universities or by both, as established in the initial agreement.

¹³ See PUBLIC LAW 96-517-DEC. 12, 1980, <http://history.nih.gov/research/downloads/PL96-517.pdf>.

universities in the first two VEF studies. While substantial changes have been made, changes in teaching methods, curriculum, and all other aspects of improvement still seem to be hampered somewhat by the lack of autonomy. Even if more autonomy has been granted, not all programs, departments, and institutions are aware that they have permission to proceed more independently.

Instructors, programs, departments, and universities have particular individual needs that relate to their fields of study, to their location in the country, to their goals and aspirations, and to the market-driven needs for education in these specializations and in these locations. No standardized policy can dictate the best practices for different institutions. For this reason, the site visitors believe that autonomy in higher education needs to be increased and expanded to the fullest extent possible.

RECOMMENDATIONS AND CONCLUSIONS

ENGLISH LANGUAGE ACQUISITION

Since English is currently the language of science, Vietnamese students pursuing STEM fields find themselves at a disadvantage if their English is poor. Furthermore, employers note that the workforce in science and engineering requires knowledge of English since so many manuals and instructions are written in English. Even those who go into business and industry need English in order to be maximally productive. English study is required at most of the universities visited, but proficiency in English is not uniformly at a high level.

Recommendations

- English education should be emphasized in school and further strengthened during university study. Based on the needs in science and technology and in the larger workforce, this knowledge will be useful for all students, even if they are not studying STEM fields.
- Courses taught in English are a good way to incorporate language training with scientific knowledge, provided that the instructors have the necessary English proficiency.

REGIONALISM

Regionalism appears to be a standard feature of Vietnamese culture, based on an individual's strong family connections and orientation. Students attend the university closest to home, and when they graduate, they work in the same town or attend graduate school at the same university. While study abroad is highly desirable, moving to another area of Vietnam is not. Indeed, few of the individuals interviewed wanted to teach at a university other than their own in Vietnam. Instructors, therefore, are mostly graduates of the same university and continue in graduate programs at the same university. Academics in the United States do not recommend continuing in graduate school at the same university, and even refer to this phenomenon as "in-breeding." The site visitors, therefore, suggest a few measures to get universities in different parts of Vietnam to interconnect.

Recommendations

- Promote national conferences, workshops, research collaborations, and grants that allow specialists from different universities to share their knowledge and perspectives.
- Consider instructor or student exchanges for a semester or a year to allow greater exposure to different approaches, methodologies, and ideas without traveling abroad.
- Create summer schools that are cooperatively operated by several universities; invite international and local speakers, including graduate students, to present their research. Local universities could take turns hosting the events.

DIVERSITY

The issue of gender in STEM education was not addressed in the previous reports. In the online questionnaires and in interviews for this report, both males and females at all levels of study affirmed overwhelmingly that opportunities for females are equal to those for males. However, it became clear during the interviews that a women's primary responsibility for cooking, cleaning, and caring for children had to be met first before they could teach and do research. Furthermore, in civil engineering, there were open assumptions: (1) women could not be involved in construction because they are physically weak; and (2) women cannot be involved in travel or field work for construction. These assumptions held true as well for those who received degrees in agriculture and needed to work outdoors. The inclusion of minorities and students from remote areas was an issue raised during the site visits. The valuable perspectives and contributions of minorities and women (more than 50% of the population) may never be utilized if they are not encouraged to pursue careers in STEM fields.

Recommendations

- Consider using promotion campaigns through the schools or via the Web, such as “Engineer Girl” in the United States that could encourage more girls, young women, minority students, and students in remote locations to consider the advantages of a career in S&T.
- Promote study in STEM fields at high schools across Vietnam, especially targeting females and minorities.

ADMISSIONS

In order to enroll in a Vietnamese university, students must take a national entrance exam and indicate their university preferences at the time of registration. There are different thresholds for acceptance at different universities, and some programs accept only students who indicate that university as their first choice. The best students tend to select other programs ahead of forestry, agriculture, and environmental sciences, which are programs of study that appear to be very important for Vietnam.

Recommendations

- Change the university selection method so that students do not need to list their preferences for a particular school and so that a good school does not exclude any applicants who have selected that university as their second choice.
- Consider more than just a raw score for admittance to a university since success in academe requires much more than the ability to excel in taking standardized tests.
- Promote fields of study such as agriculture and agribusiness that are central to the success of the Vietnamese economy. These students should not be the students with the lowest scores.

- Promote study in fields of S&T at high schools across Vietnam, targeting females as well as males.

TEACHING

Vietnamese society maintains a respectful attitude toward all teachers. While everyone interviewed - from various Ministry representatives to university Rectors to students—acknowledges that university instructors receive too low a salary, they all agree that raising instructor salaries would be an enormous expenditure for the government. However, instructors either teach extra courses in order to increase their pay or they work at another job. This leaves them with little time to meet with students, grade homework, update their teaching materials, or conduct research. Furthermore, the reform of the curriculum from units to credits has increased the work load for some instructors. Salary increases are primarily based on seniority, not on teaching evaluations, and no time release is provided for carrying out research. Instructors insist that the promotion process is time-consuming and complicated, and many claim to be unaware of what needs to be done in order to get promoted. Since there may be budgetary limitations to increasing salaries, other strategies may be required to improve the situation of dedicated university instructors.

Recommendations

- Increase instructors' salaries to the extent possible, with the goal of enabling professors to focus on being excellent teachers and researchers.
- Reduce the number of hours that an instructor must teach without reducing salary. This may be achieved, in part, by additional curriculum reform that reduces the number of credits required for graduation.
- Reward instructors for research, advising, maintaining office hours, meeting with students, and including students in research projects conducted by the instructors.
- Reward instructors for excellence in teaching, research, or service to the community by providing salary increases or other benefits, such as a laptop or dedicated space for an office or for research.
- Continue to reward instructors for publishing in international journals.
- Make the promotion process more transparent by posting the requirements and procedures publicly at the university's website and by providing the information annually to every instructor.

LEARNING

The site visitors, who were included in the earlier study, commented on the great improvements they saw in pedagogy. Students now have more homework, group projects, practical laboratory

exercises, and more frequent assessments, rather than the rote memorization and single final examination that were standard in the past. The Advanced Programs¹⁴ in Vietnam have established curricula based on foreign models and have changed from a unit-based to a credit-based system in accordance with MOET's regulations. Some students complain that the work load has increased and not all of them are pleased with the new independent study requirements (what they call self-study). However, many instructors report that they have seen an increase in their own work load since they must be present for more practice sessions that may have to be sub-divided in order to serve all the students participating in the Advanced Program. There are usually no teaching assistants to deal with grading and practice sessions.

Recommendations

- Continue and expand the use of active learning that includes discussion, open questions, group work, field work, laboratory practice, and independent study.¹⁵ Extra contact hours with students should not be added to the already heavy load of instructors without a reduction in core teaching hours or other teaching responsibilities.
- Continue with careful curricular reform, taking care not to overburden instructors or to cut out truly necessary courses from the curriculum. Fundamental knowledge and courses in the sciences should not be eliminated in favor of applied studies.
- Consider eliminating courses from the curriculum that do not relate to S&T, foreign language acquisition, soft skills, or critical thinking skills.
- Provide incentives, financial or otherwise, to instructors who maintain office hours and meet frequently with their students.
- Provide greater transparency in the grading process with an emphasis on learning outcomes.

RESEARCH

The Vietnamese educational system has been heavily modeled on a model that separated teaching institutions from research institutes. Thus, research is not necessarily embedded in Vietnamese higher education. Many science programs now include research, but only in the final year of study. Cooperation between educational institutions and research institutes could contribute positively to both institutions. Recipients of doctoral degrees, such as Ph.D.s who

¹⁴ MOET selected 34 outstanding university departments throughout Vietnam to participate in the Advanced Programs. MOET provided substantial funds to these excellent Vietnamese departments to establish collaborative arrangements with highly regarded international universities, mostly in the United States. The Advanced Programs select a well-known foreign university and invite their faculty to teach in Vietnam. To the extent possible, they adopt the foreign university curricula and establish joint-degree and study-abroad programs. Classes in the Advanced Programs are taught in English, and the Vietnamese students pay higher tuition.

¹⁵ Independent study is defined as studying on one's own outside of the classroom and using a multitude of resources while receiving credit and recognition for the work. Typically, a research paper, which is submitted to the instructor, is the final product that is the basis for the grade in the course.

return to Vietnam to teach and conduct research, need to have research laboratories and funding available if they are to remain in the country and contribute to the development of the scientific infrastructure of Vietnam.

Recommendations

- Initiate, continue, and expand the inclusion of research projects and research as part of the undergraduate and graduate educational experience. Reward instructors, who include their students in the research, and further reward them for excellent results and publications.
- When possible, co-locate universities and research institutes, especially when new facilities are in the process of being built.
- Encourage researchers at research institutes to teach at universities, and encourage instructors at universities to conduct research at institutes.
- To make more research possible, ministries, such as MOST and MARD, should be encouraged to develop and expand competitive grants programs, like those offered by the National Foundation for Science and Technology Development (NAFOSTED), with funding based on peer review of proposals.
- Consider grants to Vietnamese who have received advanced degrees abroad so that they may set up research laboratories when they return to Vietnam.

FACILITIES

Many university facilities and research laboratories have been greatly improved since the first VEF-sponsored site visits. Some laboratories have cutting-edge equipment and have greatly improved their capacity to carry out research. However, there are still great deficiencies in facilities across the spectrum at Vietnamese universities. Libraries, classrooms, laboratories, and student dormitories are still in great need of upgrading. Improving libraries and access to the scientific literature are a high priority.

Recommendations

- Enable researchers, faculty, graduate students, and undergraduates to have easy access to the scientific literature (including full journal articles) to the highest extent possible. Some professional organizations can waive or reduce access fees for developing countries. (Note that the value of these publications will be minimal if scientists are unable to read scientific English.)
- Expand use of the Vietnam Research and Education Network (see Additional Resources).
- If expensive equipment is acquired, be certain that the costs of maintenance and training are also considered.
- Provide a desk for each instructor in order to facilitate more office hours and interaction with students.

EVALUATION

Many students are now evaluating faculty at the end of each semester. Most instructors are also evaluated on an annual basis. Instructors are not rewarded financially for excellent teaching; seniority is more important than merit in determining salary. A better incentive system for instructors, which is based on teaching, research, commitment to interaction with students, and community service, should be considered in determining salary increases and promotions.

At the institutional level, many university departments are working toward accreditation with the AUN and ABET. At present, there appears to be little focus on student learning outcomes, which are considered important for accreditation. Accreditation will make it possible for university graduates to market their skills outside of Vietnam and to compete with graduates of foreign schools in international companies that operate in Vietnam. Graduation from a university that meets international norms will increase the ability of Vietnamese students to compete in the marketplace.

Recommendations

- Evaluation must be utilized in a productive way. Excellence in teaching, research, or service should be rewarded with salary increases. Seniority should only be one of the many factors involved in rewarding excellent performance.
- A number of programs in Vietnam have received AUN accreditation or are working on receiving ABET accreditation by 2017. More departments should seek such accreditation in order to improve their profiles and to attract more international students, funding, and grants. This will also make graduates more competitive in the national and international marketplace.

CONNECTIONS WITH INDUSTRY AND THE PRIVATE SECTOR

Industry does not connect much with the universities, and the educational institutions are not fully aware of what industry seeks when hiring graduates. Both entities could benefit greatly from communication and collaboration.

Recommendations

- University representatives should meet further with industry to find out what kind of preparation is needed for new hires and to find out how to establish more cooperation and collaboration in general.
- Industry can be asked to provide paid internships for students and to donate equipment to the university so that students will already be trained to use the equipment when they graduate.
- Researchers from industry could teach, give seminars, or provide training to university students in order to identify future employees.

- Tech transfer from the university to industry should be encouraged.
- Industry should be able to outsource research projects to the university, while providing money to the university, thus, acquiring for themselves necessary technical information for their own purposes without a large investment in Research and Development (R&D) staff at the industry site.

AUTONOMY

Insufficient autonomy for individual instructors, programs, departments, administrators, and universities as a whole was considered a major impediment to the development of Vietnamese universities. While substantial changes have been made, changes in teaching methods, curriculum, and all other aspects of improvement are still hampered somewhat by insufficient autonomy. Even if autonomy has been granted, not all programs, departments, and institutions are aware that they have permission to proceed more independently.

Recommendation

Instructors, programs, departments, and universities have particular individual needs that relate to their fields of study, to their location in the country, to their goals and aspirations, and to the market-driven needs for education in these specializations and in these locations. A standardized policy is not able to address the best practices for different institutions. For this reason, the site visitors hope that autonomy in higher education can be increased to the fullest extent possible.

PRIORITIES FOR ACTION

The site visitors noted that Vietnamese officials, educators, administrators, and researchers must determine their own set of priorities. Nonetheless, they suggest that the following high-priority items be considered.

- Focus on educational preparation and research in fields or subjects that have an important impact on the Vietnamese economy, such as rice production and the environmental impact of climate change in the Mekong Delta. The Vietnamese could become world leaders in areas like rice breeding and the management of rice breeding. They might also consider increasing production for export of high-value horticultural products. Similarly, Vietnam may decide that an increase in Information Technology (IT) expertise at the Master's level may serve the economy better than a large cadre of Ph.D. recipients at the present moment. Ensure that the best students are engaged in critical areas of study, including agriculture and agribusiness.
- Encourage continued efforts toward accreditation with AUN and ABET accreditation, which is critical for programs that wish to achieve international prominence. Such efforts should be advanced further.
- Provide access to professional literature (including full journal articles), which is critical to all scientists, whether researchers, instructors, graduate students, or undergraduates.

Some professional organizations can provide assistance to developing countries to cover or reduce access fees. Some sites also provide full access after a certain time lapse.

- Consider increasing instructor salaries. Additional approaches to improving the lot of instructors should be a high priority, including reducing the number of contact hours for instructors, rewarding excellent teaching performance, and providing similar rewards or funding for those who conduct research.
- Initiate, continue, and expand the inclusion of research projects and research as part of the undergraduate and graduate educational experience. Reward instructors, who include their students in research, and further reward them for excellent results and publications.
- In order to fund research, ministries, such as MOST and MARD, should develop and expand more competitive grants programs, like those offered by NAFOSTED, with funding based on peer review of proposals.
- Continue the investment in Ph.D.s trained abroad by offering them competitive grants for laboratory set-up and research projects when they return to Vietnam.
- Establish strong ties with industry for the benefit of the universities as well as industry.
- Expand the autonomy of individual programs, departments, and universities to simplify the process of making improvements that are critical to their development and success.

As an overall long-term goal, Vietnam should make sure that a university education in Vietnam, both at the undergraduate and graduate level, is equivalent of that of any university in the world. At present, the Vietnamese government sponsors large numbers of students to be educated abroad, hoping that they will return to educate the next generation. Many important positive changes have been made recently, but many significant challenges still remain. Policies should encourage the scholars, who return to Vietnam, to join the teaching and research faculties at the Vietnamese universities. The new and existing faculty can join together to make the Vietnamese universities world class institutions.

Vietnamese educational institutions have made substantial progress in the years since the first VEF research reports were published. The site visitors know that the people of Vietnam will achieve even greater progress in the years to come.

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ADDITIONAL RESOURCES

Directory of Open Access Journals (doaj.org)

The Essential Electronic Agricultural Library (TEEAL) at Cornell University (www.teall.org)

TRANSPORTATION ON-LINE SEARCHES FOR INFORMATION

Transportation Research Data Base: TRID, TRIS, ITRD

<http://www.trb.org/InformationServices/InformationServices.aspx>

Transportation Research Board Publication Index

<http://pubsindex.trb.org/>

<http://trt.trb.org/trt.asp>

American Society of Civil Engineers

<http://cedb.asce.org/>

American Public Transit Association

<http://www.apta.com/resources/Pages/Default.aspx>

PAPER AND PRESENTATION GUIDELINES

Writing a paper:

<http://onlinepubs.trb.org/onlinepubs/am/2011/WritingForTheTRRecord.pdf>

Presentation guidelines:

<http://onlinepubs.trb.org/onlinepubs/am/2012/AVandSpeakingTips.pdf>

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Vietnam Research and Education Network or VinaREN (www.vinaren.vn)

APPENDIX 1:
***EXECUTIVE SUMMARY OF OBSERVATIONS ON UNDERGRADUATE
EDUCATION IN COMPUTER SCIENCE, ELECTRICAL ENGINEERING,
AND PHYSICS AT SELECT UNIVERSITIES IN VIETNAM (AUGUST 2006)***

The project entitled *Observations on Undergraduate Education in Computer Science, Electrical Engineering, and Physics at Select Universities in Vietnam* was conducted under the auspices of the Vietnam Education Foundation (VEF), an independent U.S. Federal agency. This project, referred to as the VEF Undergraduate Education Project, was begun at the request of Prof. Dr. Nguyen Thien Nhan, presently Minister of Education and Training and, at the time of the request, the Vice Chairman of the People's Committee of Ho Chi Minh City. The project was conducted with the cooperation and support of the Ministry of Education and Training (MOET) and the co-sponsorship of the University of Social Sciences and Humanities (USSH) of the Vietnam National University in Ho Chi Minh City (VNU-HCM), the Southeast Asian Ministers of Education Organization Regional Training Center (SEAMEO RETRAC) in Vietnam, and the Institute for Educational Research in Ho Chi Minh City (IER-HCMC).

Through the auspices of the National Academies in the United States, leading American experts in assessment and instructional design and experts in the selected scientific and engineering fields joined this effort. The Undergraduate Education Project was a multiple case study, qualitative research project with the following phases: (1) Phase 1 from January to August 2006, to assess the current conditions of teaching and learning in computer science, electrical engineering, and physics at four select universities in Vietnam and to identify opportunities for change; (2) Phase 2 from September 2006 to August 2009, to assist in implementing changes; and (3) at the end of Phase 2, to produce models that can be adopted across academic fields and institutions.

Four Vietnamese institutions (two in Hanoi and two in Ho Chi Minh City) were selected to participate in this Undergraduate Education Project. Their names are kept in confidence to preserve their identity and respect their openness and honesty in participating in this study. This project is intended to help higher education leaders and managers in their efforts to advance curriculum, pedagogy, and evaluation in the sciences and engineering in Vietnam.

Site visits in May 2006 by two U.S. multidisciplinary expert teams led to the conclusion that there are five critical areas of Vietnam higher education in need of change: undergraduate teaching and learning, undergraduate curriculum and courses, instructors, graduate education and research, and assessment of student learning outcomes and institutional effectiveness. Not all of the issues identified are present in all of the programs, departments, and institutions that were visited. Nonetheless, the teams identified many good examples of solutions to the problems and issues that can provide models for others to adopt. Furthermore, the teams found very good students; dedicated, hard-working, and competent junior and senior faculty members; and

enthusiastic and forward looking administrators at all levels. They also found exciting research currently underway and the use of advanced technologies and equipment.

Specifically, the teams identified *Issues and Opportunities for Change* in relationship to the five critical areas and offered general recommendations for consideration at the national level. The following list highlights the primary issues and opportunities as this section comprises an essential part of the report. The bulleted items under each area briefly describe the major issues that were identified and the potential solutions suggested by the site visit teams related to these issues. Please note that the conclusions reached by the U.S. expert teams are specific to the situations that they evaluated and may not be universally true in all cases. Also, please note that the issues are purposefully not listed in any order of priority, and thus are not enumerated.

Undergraduate teaching and learning

- Ineffective teaching methods: lectures, presentation of factual knowledge, rote memorization, little use of homework, not much faculty-student interaction.
Potential solutions include incorporating active learning strategies, requiring graded homework, emphasizing conceptual learning or higher order learning, and establishing Centers of Teaching and Learning Excellence.
- Inadequate facilities and resources.
Potential solutions include modernizing classrooms, libraries, and laboratory facilities; and providing resources (people and equipment) to support teaching and learning.

Undergraduate curriculum and courses

- Too many courses (over 200 credits to graduate).
Potential solutions include giving more autonomy to institutions in terms of curriculum content and sequencing so that departments can consolidate courses in order to decrease the overall number of credits to graduate.
- A large number of requirements and few choices.
Potential solutions include increasing flexibility and providing more elective courses.
- Out-of-date content of individual courses and the overall curriculum, which are not at the same level of top universities worldwide. In particular, not enough concepts and principles are taught and too much emphasis is placed on factual knowledge and skills.
Potential solutions include emphasizing higher order thinking skills (application, analysis, synthesis, and evaluation) in instruction and then testing for higher order thinking skills.
- An imbalance between theoretical courses (concepts and principles with too much emphasis on factual knowledge) and applied/practical courses (laboratory or practicum experiences).

Potential solutions include developing more applied hands-on experience, practical applications, exercises, and projects.

- Lack of common or professional skills (team work, oral and written communication in English, project management, problem solving methods, pro-active initiative-taking, life-long learning).

Potential solutions include providing English language instruction and providing opportunities to develop skills through course activities and in real-life settings (work-study, internships, and practicum experiences).

- Lack of flexibility to transfer between majors.

Potential solutions include developing articulation agreements between majors within the same institution and between institutions.

- Courses and curricula are not guided by explicit statements of expected student learning outcomes.

Potential solutions include providing expectations for, and assistance in, developing student learning outcomes as the basis for program curricula and course syllabi.

Instructors

- Lack of qualified teachers.

Potential solutions include increasing research-oriented universities and having top universities produce undergraduate instructors for other Vietnamese universities.

- Low level of academic preparation of teaching faculty.

Potential solutions include providing advanced degree opportunities in Vietnam and abroad.

- Lack of skills of faculty in modern teaching practices and research.

Potential solutions include conducting professional development programs in pedagogy and research skills.

- Lack of up-to-date knowledge by faculty in their fields with regard to curriculum and course content.

Potential solutions include providing access to recent scholarly resources, up-to-date curricula, syllabi, and related learning materials on the Web.

- Faculty overworked and underpaid for an acceptable teaching load and, therefore, lack the time necessary for teaching preparation, availability to students, and research.

Potential solutions include reducing teaching load; hiring and paying instructors “full-time” with understanding that they will work 40 hours per week at their home institution with a balance of teaching, research, and service; and increasing time for research by

providing support and assistance in the form of teaching assistants as graders, research assistants, and clerical assistants.

- No incentives for faculty to upgrade teaching skills, courses and curricula, and research ability since promotion and salary increases seem to be based on teaching load and seniority, not on merit, performance, or conducting research.

Potential solutions include establishing merit-based reward system; rewarding and recognizing teachers who make improvements in teaching, learning, and research.

Graduate education and research

- Little opportunity for Ph.D.s, who have studied abroad, to pursue their research or apply the teaching methods learned abroad when they return to Vietnam.

Potential solutions include hiring Ph.D.s, who have studied abroad, when they return to Vietnam to provide leadership in disseminating the use of the discipline knowledge, teaching methods, and research skills; providing adequate graduate library resources and access to recent scholarly resources on the Web; upgrading laboratories; and offering support for international conference attendance.

- Academic inbreeding, thus inhibiting a dynamic research environment.

Potential solutions include employing graduates from other universities.

- Separation of research institutes and laboratories from teaching departments, thus limiting the opportunities for many faculty members to engage in research activities.

Potential solutions include reorganizing the structure and relationships of the universities, research institutes, and laboratories so that more research is conducted in universities by teaching faculty and graduate students.

Assessment of student learning outcomes and institutional effectiveness

- Lack of clearly articulated and coordinated student learning outcomes at the institutional, departmental, program, and course levels.

Potential solutions include setting expectations for the creation and use of student learning outcomes at the institutional level, basing program curricula on general student learning outcomes, including specific student learning outcomes in course syllabi, and providing support for development and implementation of student learning outcomes through Centers of Teaching and Learning Excellence and University Assessment Centers.

- Institutional effectiveness not evaluated in terms of student learning. As a result, faculty have little motivation since few incentives or rewards are given for change.

Potential solutions include holding institutions accountable for improving student achievement as part of institutional accreditation; and basing resource allocation for institutions, departments, and programs, at least in part, on student learning outcomes.

- Program and course quality not based on evaluation of student learning.
Potential solutions include developing and implementing a system of program review based in part on the achievement of student learning outcomes in individual courses and in the program as a whole, as well as developing and implementing a system for course evaluation and annual review of faculty to provide feedback on teaching and learning for the purpose of improvement.
- Lack of institutional research infrastructure at university level.
Potential solutions include creating offices of institutional research, providing training for academic administrators responsible for research functions, and providing electronic resources for tracking, analyzing, and reporting student data including enrollment, progress toward degree, graduation, and learning outcomes.

Recognizing that MOET has a significant role in relationship to Vietnamese universities, the U.S. expert teams also identified broader, more general recommendations, suggesting that MOET might want to consider the following:

- ❖ How to expand the university education system throughout Vietnam, with appropriate distribution across the country, so as to increase accessibility to more high school students to obtain a university education. The current 255 universities do not meet the demand.
- ❖ Ways to prepare highly trained future faculty by empowering the current major universities to produce excellent teachers in sciences and technology for the other Vietnamese universities.
- ❖ Options for making a strategic decision to fund fundamental and basic research in universities to ensure future generation of scientists.
- ❖ Possibilities for providing more local institutional autonomy and flexibility to enhance quality and to keep curricula up-to-date.
- ❖ How to develop the accreditation process to include assessment of student learning outcomes and to work with local institutions to develop or enhance the program review process for academic departments.
- ❖ Ways to develop a mechanism to ensure that resources distributed are based on merit and quality.
- ❖ How to evaluate the level of quality of universities across Vietnam, based on student learning and research, and to establish a mechanism to assist those institutions at a lower level of quality to rise to the highest possible level.
- ❖ How to enable access to the latest public information for all universities via high speed Internet connections to electronic journals and data bases.
- ❖ Ways to build instructor capacity in content, teaching methods, interaction with students, and research through systematic professional development efforts.
- ❖ How to reorganize the faculty workload to give instructors more time for preparation, interaction with students, and research.

- ❖ Ways to revise and reorganize the MOET mandated curriculum so that students spend more time on learning relevant content and on integrating course information.
- ❖ How to improve teaching methods in high school to better prepare students for a new, more demanding, post-secondary education.
- ❖ Ways to help high school students to be prepared to choose a major while still in high school.

In addition to *Issues and Opportunities for Change*, this report includes the following sections: *Discipline Specific Observations*, that presents brief comments on the specific areas of computer science, electrical engineering, and physics; *Scenarios for Change*, that presents scenarios at the national, regional, institutional, and programmatic levels; and *Conclusions*, in which the educational importance of this Undergraduate Education Project is discussed. The report also includes extensive appendices providing more details on various aspects of the project.

APPENDIX 2:
EXECUTIVE SUMMARY OF OBSERVATIONS ON THE CURRENT STATUS
OF EDUCATION IN THE AGRICULTURAL SCIENCES IN VIETNAM
(JANUARY 2007)

A strong agricultural sector is key to economic development, and, in turn, agricultural productivity is dependent upon a broad-based system of education and research in the agricultural sciences. Recognizing this relationship, the Vietnam Education Foundation identified education in the agricultural sciences as a priority for its various programs. With that background, VEF asked the U.S. National Academies to provide an overview of the current status of education in the agricultural sciences in Vietnam. The project reported here was carried out with the cooperation and support of the Ministry of Education and Training (MOET), the Ministry of Agriculture and Rural Development (MARD), the Vietnamese Academy of Agricultural Sciences (VAAS), as well as four cooperating agricultural universities, Hanoi Agricultural University (HAU), Thai Nguyen University of Agriculture and Forestry (TUAF), Can Tho University (CTU), and Nong Lam University (NLU).

The objective of this project was to develop an understanding of the current status of education in the agricultural sciences in Vietnam. To accomplish this objective, background information was collected on these four leading universities in the agricultural sciences and a site visit was conducted by a team of experts organized by the U.S. National Academies. During the visit, the team met with senior government officials and with senior administrators and faculty at these four leading universities in the agricultural sciences. At the conclusion of the site visit, the team prepared a summary of their observations as well as a series of recommendations for building capacity in agricultural education.

The recommendations described in this report cover many aspects of education, research, and extension, focusing on some common themes. These common themes include: 1) decentralizing governance of the educational system in matters of curriculum development and faculty development and advancement; 2) moving toward a system of comprehensive education which avoids over-specialization; 3) adopting teaching methods that reduce the volume of courses and credits and that emphasize student learning-based methods; 4) providing adequate funding of facilities (libraries, laboratories, classrooms); 5) integrating research and extension with teaching at the universities and encouraging greater cooperation between the universities and institutes; and 6) promoting the importance of English language skills to both students and faculty.

APPENDIX 3:
LIST OF 14 PARTICIPATING UNIVERSITIES

#	Participating Universities	Location	Research Fields
PARTICIPATING UNIVERSITIES IN THE NORTH (8)			
1	Hanoi University of Agriculture*	Hanoi	Agricultural Sciences
2	Hanoi University of Science and Technology*	Hanoi	Computer Science Electrical Engineering (Mechatronics Engineering)*** Environmental Sciences Physics
3	National University of Civil Engineering*	Hanoi	Civil Engineering
4	Thai Nguyen University of Agriculture and Forestry, Thai Nguyen University *	Thai Nguyen	Agricultural Sciences
5	University of Transport and Communications*	Hanoi	Civil Engineering*** Transport and Communications
6	University of Transport Technology**	Hanoi	Transport and Communications
7	Vietnam National University - Hanoi University of Engineering and Technology	Hanoi	Computer Science Electrical Engineering
8	Vietnam National University - Hanoi University of Science	Hanoi	Environmental Sciences*** Physics
PARTICIPATING UNIVERSITIES IN THE SOUTH (6)			
9	Can Tho University*	Can Tho	Agricultural Sciences Environmental Sciences
10	Ho Chi Minh City University of Transport**	HCMC	Civil Engineering Transport and Communications
11	Nong Lam University*	HCMC	Agricultural Sciences Environmental Sciences
12	Vietnam National University - Ho Chi Minh City International University	HCMC	Electrical Engineering

13	Vietnam National University - Ho Chi Minh City University of Science	HCMC	Computer Science*** Environmental Sciences Physics
14	Vietnam National University - Ho Chi Minh City University of Technology	HCMC	Civil Engineering Computer Science Electrical Engineering Environmental Sciences Physics Transport and Communications

* Under the Ministry of Education and Training

** Under the Ministry of Transport

*** Advanced Programs

APPENDIX 4:

LIST OF CONTRIBUTORS AND VOLUNTEERS

The following list of contributors is sorted alphabetically by Vietnamese university name and then by family name in accordance with Vietnamese name order. The volunteers appear at the end of this list. The list might not include all contributors if they have not provided their full names.

The term “Faculty” is used in Vietnamese universities to refer to the equivalent of a “Department” in U.S. higher education. The term “Department” is used in Vietnamese universities to mean the equivalent of a “Major” in U.S. higher education. Some of the participants used the designation “College,” “School,” or “Institute” instead of “Faculty” when referring to their affiliation.

A: Administrator

I: Instructor

S: Student

GS: Graduate Student

AL: Alumni

E: Employer

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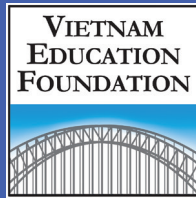
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